DOCUMENT RESUME

ED 093 359 IR 000 846

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TITLE	On-Line Administrative Information Systems: A Case Study.
INSTITUTION	Vermont Univ., Burlington. Office of Management Information and Computing.
PUB DATE	Oct 73
NOTE	21p.; Paper presented at the EDUCOM Fall Conference (Princeton, New Jersey, October 1973)
AVAILABLE FROM	"Facts and Futures: What's Happening Now in Computing for Higher Education", Proceedings of the Fall 1973 EDUCOM Conference; EDUCOM, P. O. Box 364, Princeton, New Jersey 08540 ($9.00)
EDRS PRICE	MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS	*Computers; Computer Science; *Information Systems; Management Information Systems; *Program Descriptions; *University Administration
IDENTIFIERS	OASIS; Online Administration Information System; *University of Vermont

ABSTRACT

A case study approach is used to document the on-line information system developed by the Office of Management Information and Computing at the University of Vermont. Stanford University's Project INFO On-Line Administration Information System, OASIS, was chosen as a model. The administrative system is one of two on campus, the other designed for academic use. Appendixes provide organization charts of the university and the Office of Management Information and Computing, a schematic diagram of the computer system, the current systems being used, the file structure, and examples of the use of the computer inquiry service, QUERY. (WH)

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ED 093359

ON-LINE ADMINISTRATIVE INFORMATION SYSTEMS: A CASE STUDY

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Information and Computing
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The approach taken in this paper is that of case study. Its purpose is to display administrative systems capability at the University of Vermont and what it took in time and resources to attain this capability.

The University of Vermont is not overly endowed in its wherewithal. It is a fair sized institution with an enrollment of approximately 10,000 students, full and part-time. There are two computing centers on campus, one academic and one administrative. The Academic Computation Center makes available to faculty and students time-sharing services via a Xerox Sigma 6 System. The Office of Management Information and Computing (OMIC) is the administrative computing arm of the University. The remainder of this paper is given over to this Office, its position in the organization of the University, its wherewithal equipment and staff-wise, and its accomplishments over the past three years.

The overall structure and organization of the University is shown in Appendix A. All academic colleges and departments report directly to an Academic Vice-President whereas all administrative departments and offices report, at a like level, to an Executive Vice-President. The fact that the Office of Management Information and Computing reports at the Vice-Presidential level has assisted greatly in the accomplishments that have been brought to bear in the past two years. This fact has been extremely helpful in the transition from manual to administrative computer processing.

Generally speaking, prior to 1971, the track record of data processing in the generic sense was at best fair to good. Data was invariably inaccurate, incomplete and untimely. At that point in time, one computer system - an IBM 360/44 was shared by the academic and administrative community. In the spring of 1971, it was decided that two centers, each distinct from the other, would be established. Furthermore, the administrative center would pursue the implementation of, and be dedicated to, a data management system and a data base approach to integrated files and applications development. Toward this end, IBM's IMS/GIS package was examined. But in the context of an IBM 370/145 256K memory environment, IMS/GIS was infeasible under a design requirement of 10-20 CRT terminals. This, coupled with a $20,000 per annum rental price made it clear that IBM's data management entry was

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beyond the realm of further serious consideration. OASIS, Stanford university's Project INFO On-Line Administrative Information System, would prove to be a viable alternative. Following upon an examination of OASIS services and hardware requirements in the fall of '71, an initial version of the system was acquired in December. In March, 1972, the first two Sanders 720 video display terminals were installed and were made operational against a test version of a Personnel file. The ability to rapidly demonstrate OASIS services (Query and Report Writer) against an actual file went a long way toward creating a measure of acceptance and enthusiasm, on the part of administrators, in respect to on-line files, terminals, data management software and the like.

Appendix B makes reference to the staff capability of the Office. Note that in the systems development area there are ten people. They are involved heavily in maintenance as are most administrative computing groups. Thus, a major problem is maintenance of existing systems, while simultaneously creating a data base design in areas of priority concern. Basically, these areas have been Personnel/Payroll/Salary Distribution, Facilities, and Student Records encompassing Admissions and Financial Aid data. Overall, the Office has a staff of thirty. Beyond the ten engaged in development, other than supervisory and clerical personnel, the remainder are in data center operations and data preparation. The budget of the Office, by the way, is some $565,000 for fiscal 1974. This sum is approximately evenly distributed between staff salaries and operating expenses - equipment rental, forms costs, etc.

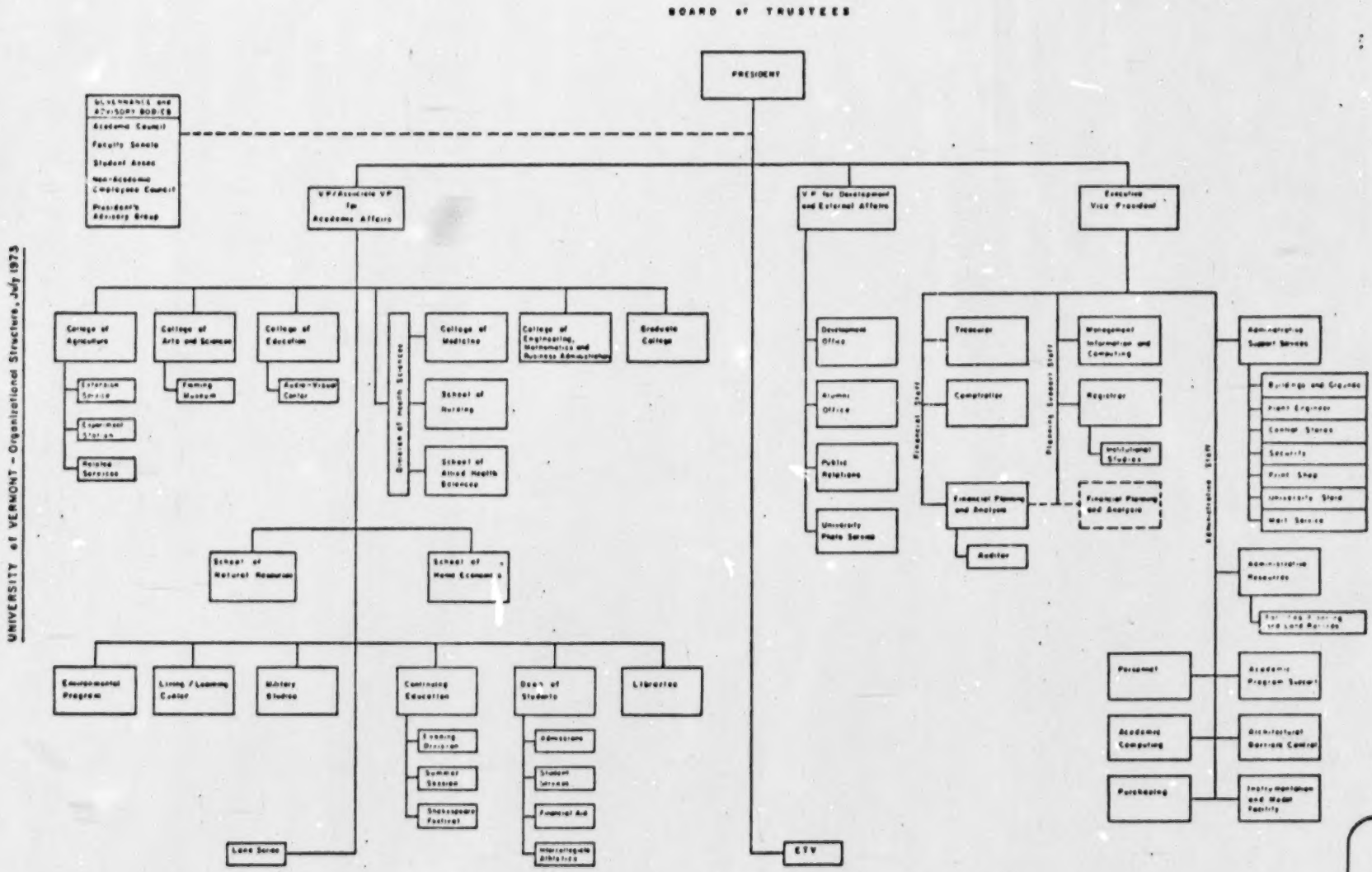
Appendix C depicts the equipment resource, i.e., an IBM 370/145 with a memory of 256K, seven disk spindles, three tape drives, etc. The on-line data bases reside on 3.5 spindles; and, there are currently eleven CRT terminals installed throughout the institution. These terminals are located in the Registrar's Office, Financial Aid, Admissions, Personnel/Payroll and within OMIC itself. As for the foreseeable future, we envision growth to upwards of fifteen to eighteen administrative terminals on campus.

The set of applications of the computer are, for the most part, traditional (Appendix D). Certainly many of these applications existed prior to the establishment of OMIC. Relative to Appendix D, those systems noted with an asterisk are OASIS Systems, i.e., on-line. These are the systems that allow for inquiry via remote terminals and for the generation of reports and file updating, again, via terminals.

A specific word about inquirv: this is accomplished through a data management OASIS service called QUERY. This service need not be predetermined; it is open-ended. It allows for response to questions on the spot, on demand as formulated at the moment. There is essentially no constraint as to what may be retrieved. Some examples of QUERY are offered in Appendix G. Under these circumstances, it might be said that OMIC has provided distributed data through a centralized computation center. Finally, in respect to Appendix D, it might also be mentioned that the systems listed are comprised of some 550 computer programs.

Appendix E makes reference to OASIS per se. The OASIS file is of course made up of traditional records and the records themselves are made up of segments. Segments have the ability of occuring from zero to many times. So, if a piece of the data is not required at a particular point in time, it is not resident on the system. In that sense there are variable length records within the OASIS file; i.e., segmentation permits us to modify the file fairly easily. As experience is gained with the sundry data bases we find in fact that some of the elements are not used, are no longer required; or we find that other elements must be defined. It is a fairly simple task to modify the record and this responds to an oft posed question, that is, "how do we get to the point where defined data bases can be easily modified as dictated by the learning process?" The way OASIS has been designed by the Project INFO technical staff, this is a fairly simple task. We have already done this numerous times. The data bases we have designed have been changed many times over since their initial definition - and we're still doing it. Appendix F is intended for the readers' general perusal. It provides for an appreciation of the magnitude of those primary and secondary files resident on the 3.5 spindles alluded to earlier.

In summary, on-line files development at the University of Vermont has occured only over the past two years. This work has included basic data definitions, programming, testing, training, - indeed, all required aspects leading to systems implementation. This then, is where we are today.

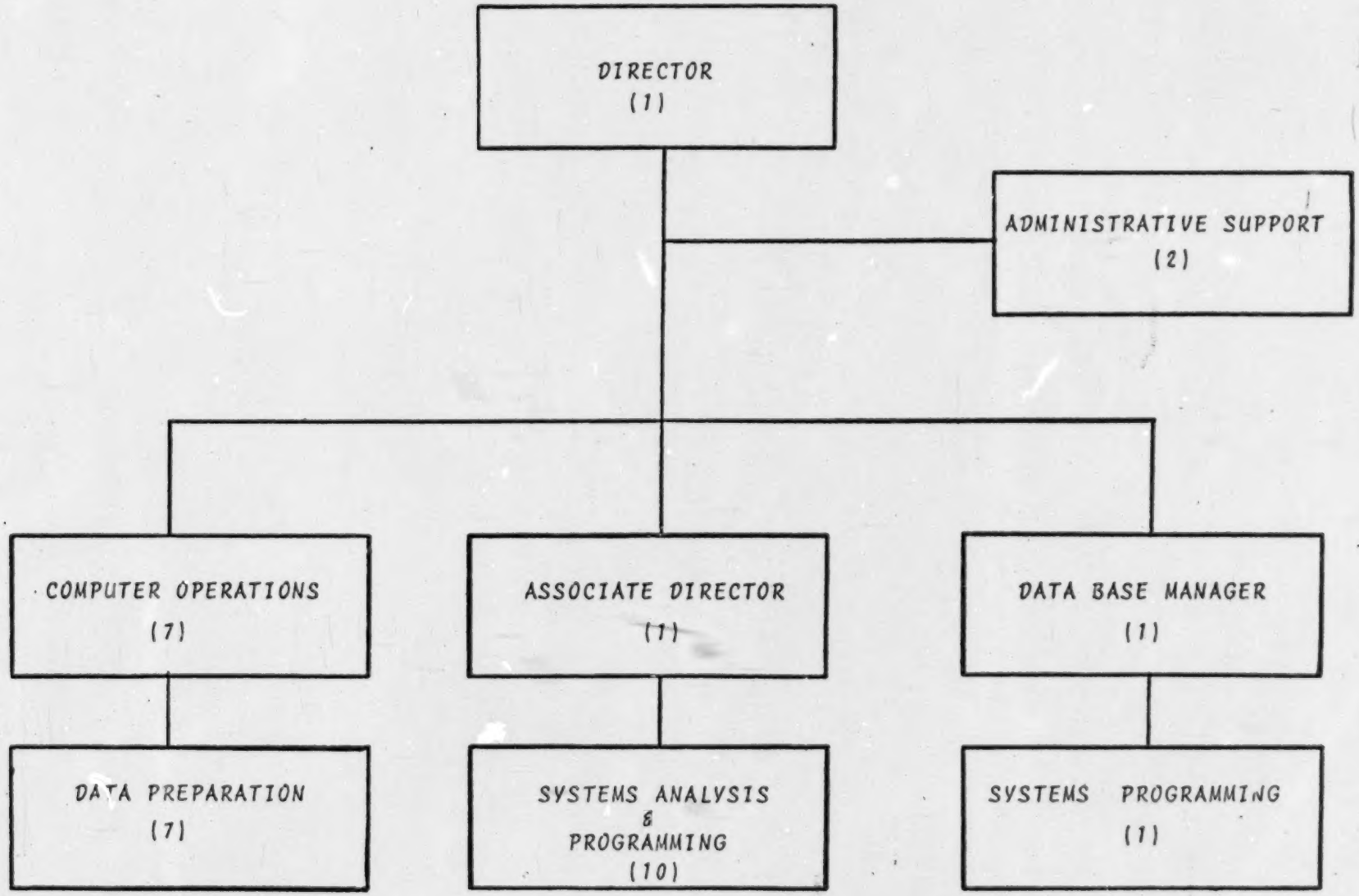


UNIVERSITY of VERMONT – Organizational Structure, July 1973

APPENDIX A

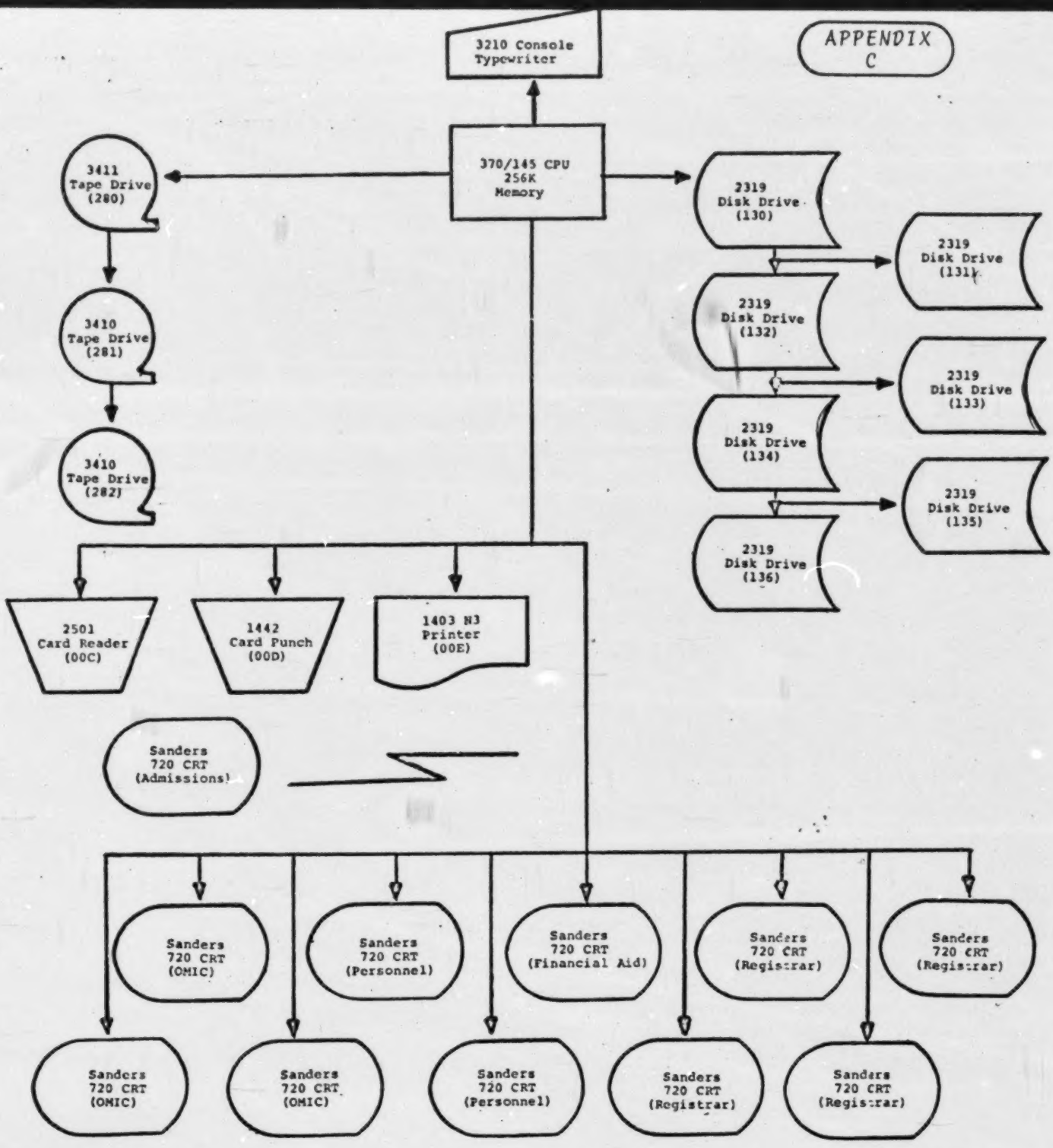
UNIVERSITY OF VERMONT

OFFICE OF MANAGEMENT INFORMATION AND COMPUTING



APPENDIX B

APPENDIX C


3210 Console Typewriter
370/145 CPU 256K Memory
3411 Tape Drive (280)
3410 Tape Drive (281)
3410 Tape Drive (282)
2319 Disk Drive (130)
2319 Disk Drive (131)
2319 Disk Drive (132)
2319 Disk Drive (133)
2319 Disk Drive (134)
2319 Disk Drive (135)
2319 Disk Drive (136)
2501 Card Reader (00C)
1442 Card Punch (00D)
1403 N3 Printer (00E)
Sanders 720 CRT (Admissions)
Sanders 720 CRT (OMIC)
Sanders 720 CRT (Personnel)
Sanders 720 CRT (Financial Aid)
Sanders 720 CRT (Registrar)
Sanders 720 CRT (Registrar)
Sanders 720 CRT (OMIC)
Sanders 720 CRT (OMIC)
Sanders 720 CRT (Personnel)
Sanders 720 CRT (Registrar)
Sanders 720 CRT (Registrar)

APPENDIX D

UNIVERSITY OF VERMONT

Office of Management Information and Computing

CURRENT SYSTEMS

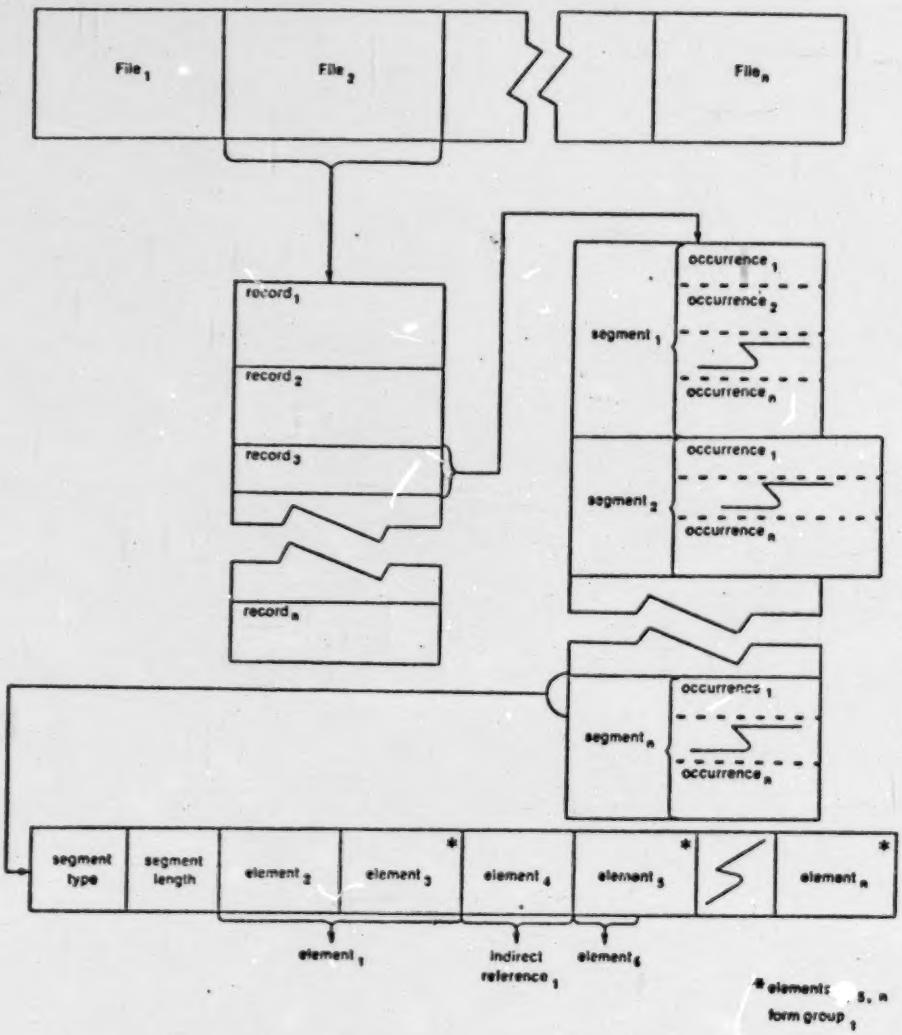
a. Accounts Payable
b. Accounts Receivable
c. Alumni Records
d. Audiovisual
e. Automobile Registration
*f. Board (College) Scores
g. Bookstore Inventory
h. Budget Planning and Analysis
i. Centrex (telephone) Billing
j. Class Scheduling
k. Computer Billing
l. Current Payroll Systems
m. Current Student System
n. Data-Text System (Sociology)
o. Experimental Programs
*p. Facilities
q. Financial Accounting
r. Gift Accounting
s. Graduate College Admissions
*t. Grants Information
u. Health Sciences
v. High School Scheduling
w. Induced Course Load Matrix (ICLM)
x. Library Periodicals
y. Mail Service List
z. Medical Books
aa. Moveable Equipment
bb. Shop Stores Inventory
cc. Student Pre-Billing
dd. Tape Library
ee. Label Utilities

NEW SYSTEMS

*a. Personnel/Payroll/Distribution
*b. New Student System
    1. Admissions
    2. Financial Aid
    3. Registration
    4. Drop/Add
    5. Billing
    6. Grade Reporting
    7. Course/Section Master
    8. Counseling and Testing

*OASIS SYSTEM

APPENDIX
E



OASIS File Structure

PRIMARY:

FILE NAME:	NUMBER OF RECORDS:	- SEGMENTS - TYPES POSSIBLE:	TYPES USED:	TOTAL USED:	# OF ELEMENTS	AVG. REC. LENGTH:	TOTAL # BYTES:	SPACES USED:
ACADEMIC PROGRAM SUPPORT	588	8	8	2,078	105	246	144,740	177
ASSIMILATED STUDENT PROFILE	27,583	65	38	551,757	414	651	17,946,358	17,940
A.S.P. - TEST FILE	921	65	37	18,149	414	707	651,010	833
COURSE SECTION MASTER	5,889	14	4	13,336	109	94	553,168	491
PERSONNEL/PAYROLL DISTRIBUTION	4,484	45	30	70,895	307	410	1,838,218	2,070
P.P.D. - TEST FILE	444	45	35	7,620	307	590	262,040	322
FACILITIES ROOM INFORMATION	9,984	8	2	16,590	53	55	544,692	1,046

NUMBER OF ELEMENTS DOES NOT INCLUDE INDIRECT REFERENCES OR GROUP NAMES.

TOTAL NUMBER OF CHARACTERS DOES NOT INCLUDE RECORD GROWTH FACTORS OR SLACK BYTES.

SPACE USED IS CALCULATED IN 'PAGES'. A PAGE = 1,692 BYTES. FOUR (4) PAGES FIT ON A TRACK OF A 2314. THE SPACE USED DOES NOT INDICATE SPACE ALLOCATED TO PERMIT FOR ADDITIONAL INFORMATION. (E.G., RECORD EXPANSION AND/OR ADDITION.)

APPENDIX F

SECONDARY:

FILE LABEL:	NUMBER OF RECORDS:	- SEGMENTS - TYPES POSSIBLE:	TYPES USED:	TOTAL USED:	# OF ELEMENTS	AVG. REC. LENGTH:	TOTAL # BYTES:	SPACES USED:
ACADEMIC STATUS	4	1	1	4	2	16	64	4
ACHIEVEMENT TEST NAMES	16	1	1	16	2	18	288	4
AGENCY NAMES	363	1	1	363	2	44	15.972	19
AID INTENT DESCRIPTION	7	1	1	7	2	28	196	4
COMPUTER BILLING CHARGES	56	1	1	56	3	40	2.240	5
BUILDING FILE	316	5	3	911	23	113	35.612	44
CAMPUS NAMES	8	1	1	8	2	18	144	4
CLASS NAMES	17	1	1	17	3	26	442	4
COLLEGE NAMES	39	1	1	39	3	26	1.014	4

SECONDARY:

FILE LABEL:	NUMBER OF RECORDS:	- SEGMENTS - TYPES POSSIBLE:	TYPES USED:	TOTAL USED:	# OF ELEMENTS	AVG. REC. LENGTH:	TOTAL # BYTES:	SPACES USED:
BUILDING COMPLEX TABLE	3	1	1	3	2	16	48	4
DEGREE NAMES	19	1	1	19	2	28	532	4
DEPARTMENT NAMES	210	1	1	210	3	30	6,300	13
DEPARTMENT CODES	171	1	1	171	4	32	5,472	12
DISCIPLINES	0	1	0	0	3	30	0	0
JOB CODE WORK FILE	549	1	1	549	2	32	17,568	25
ROOM FUNCTION TABLE	21	1	1	21	2	16	336	4
HIGH SCHOOL NAMES	2,361	1	1	2,361	2	26	61,386	85
JOB CODES	550	1	1	550	2	32	17,600	24

SECONDARY:

FILE LABEL:	NUMBER OF RECORDS:	- SEGMENTS - TYPES POSSIBLE:	TYPES USED:	TOTAL USED:	# OF ELEMENTS	AVG. REC. LENGTH:	TOTAL # BYTES:	SPACES USED:
LANGUAGE NAMES	25	1	1	25	2	14	350	4
LEASE TABLE	4	1	1	4	2	12	48	4
MAJOR NAMES	201	1	1	201	6	40	8,040	11
RACE NAMES	5	1	1	5	2	12	60	4
REPORT WRITER FILE	45	11	10	569	1	3,184	143,292	111
STUDENT STATUS DESCRIPTION	17	1	1	17	2	24	408	4
RACE SUBGROUP NAMES	4	1	1	4	2	18	72	4
VERMONT TOWN NAMES	248	1	1	248	2	26	6,448	10
FACILITIES TYPE TABLE	92	1	1	92	2	18	1,656	5
FACILITIES USABILITY TABLE	5	1	1	5	2	16	80	4
TOTALS (4 PAGES)					1,796		22,265,894	23,303

APPENDIX G

EXAMPLE:

FIND THE OVERALL PERCENT OF SALARY INCREASE FOR THE UNIVERSITY FOR FY '74.

KEY: PAY.TYPE - 1 AND 2, SALARIED EMPLOYEES
LSTA.CODE - LEAVE,SABB,TERMINATED,ACTIVE
CURRENT.SAL.BASE - CURRENT FISCAL SALARY
PRI.SAL.BASE - PRIOR FISCAL SALARY

STEP 1: SUM CUR.SAL.BASE - SUM PRI.SAL.BASE
WHERE PAY.TYPE RN 1/2 AND LSTA.CODE NE 'T' AND PRI.SAL.BASE NE Ø.

RETURNS: EXPRESSION
SUM CUR.SAL.BASE VALUE 21,885,265.36
SUM PRI.SAL.BASE VALUE 20,658,168.00
1,227,097.36

STEP 2: 100 * 1227097 / SUM PRI.SAL.BASE
WHERE PAY.TYPE RN 1/2 AND LSTA.CODE NE 'T' AND PRI.SAL.BASE NE Ø.

RETURNS: EXPRESSION
SUM PRI.SAL.BASE VALUE 20,658,168.00
5.94

RECORDS COUNT H.RANK MAX H.RANK AVG H.RANK MIN H.RANK WHERE SY EQ 373 AND FIN EQ 'A' AND SEX EQ 'F' AND RES EQ 'I'.

RECORD COUNT IS	880	# IN SELECT
COUNT H.RANK VALUE	760	# HAD H.RANK INPUTED
MAX H.RANK VALUE	80	
AVG H.RANK VALUE	60	
MIN H.RANK VALUE	25	

POPULATION IS IN-STATE, FEMALES WHO HAVE APPLIED AND BEEN ACCEPTED FOR FALL '73 SEMESTER.

H.RANK IS USED AS A STANDARD SCORE SCALE FOR PREDICTION STUDIES OF EACH YEAR'S APPLICANT POPULATION.

1) SUM AMT.AWARDED.A WHERE COLLEGE.DEPT EQ 'MEDICINE' AND AWARD.START.DATE.A GR 720630 AND AWARD.STOP.DATE.A LS 730701.

GIVES $ AMOUNT FOR DEPT OF MEDICINE FOR ALL AWARDS THAT STARTED AND ENDED WITHIN THE FISCAL YEAR.

---

2) PROJECT.TITLE AMT.AWARDED.T START.DATE.T STOP.DATE.T WHERE DIRECTOR EQ SMITH, TH

GIVES ALL PROJECTS, TOTAL AMOUNT AWARDED FOR EACH AND DATE OF PERIOD COVERED FOR ONE FACULTY MEMBER.

---

3) APPLIC.TYPE.A AWARD.STOP.DATE.A SPON.CODE UVMID DIRECTOR WHERE AWARD.STOP.DATE.A
RN 730901/731231

GIVES ALL CURRENT AWARDS THAT WILL RUN OUT WITHIN THE SEPT-DEC. PERIOD OF THIS YEAR.

---

4) SUM TOT.DOLS.REQ WHERE APPLIC.DATE.N RN 730101/730917 TAND PEND.CODE.N EQ 'P' AND SPON.CODE RN 'AN0000'/'AN9999'.

GIVES TOTAL $ AMOUNT REQUESTED FROM NATIONAL SCIENCE FOUNDATION SINCE THE 1ST OF THE YEAR, WHICH HAS NOT YET BEEN AWARDED OR REJECTED (IS STILL PENDING) - NEW APPLICATIONS, NOT ADDITIONS TO OLD ONES.